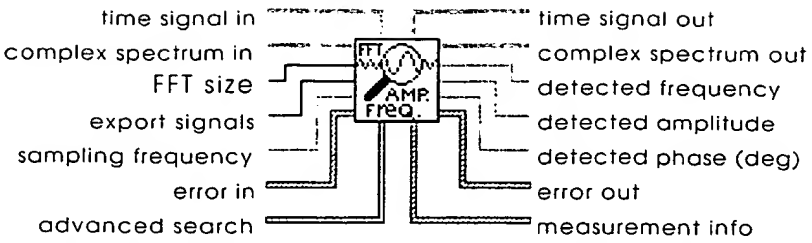
Appendix A
Source Code

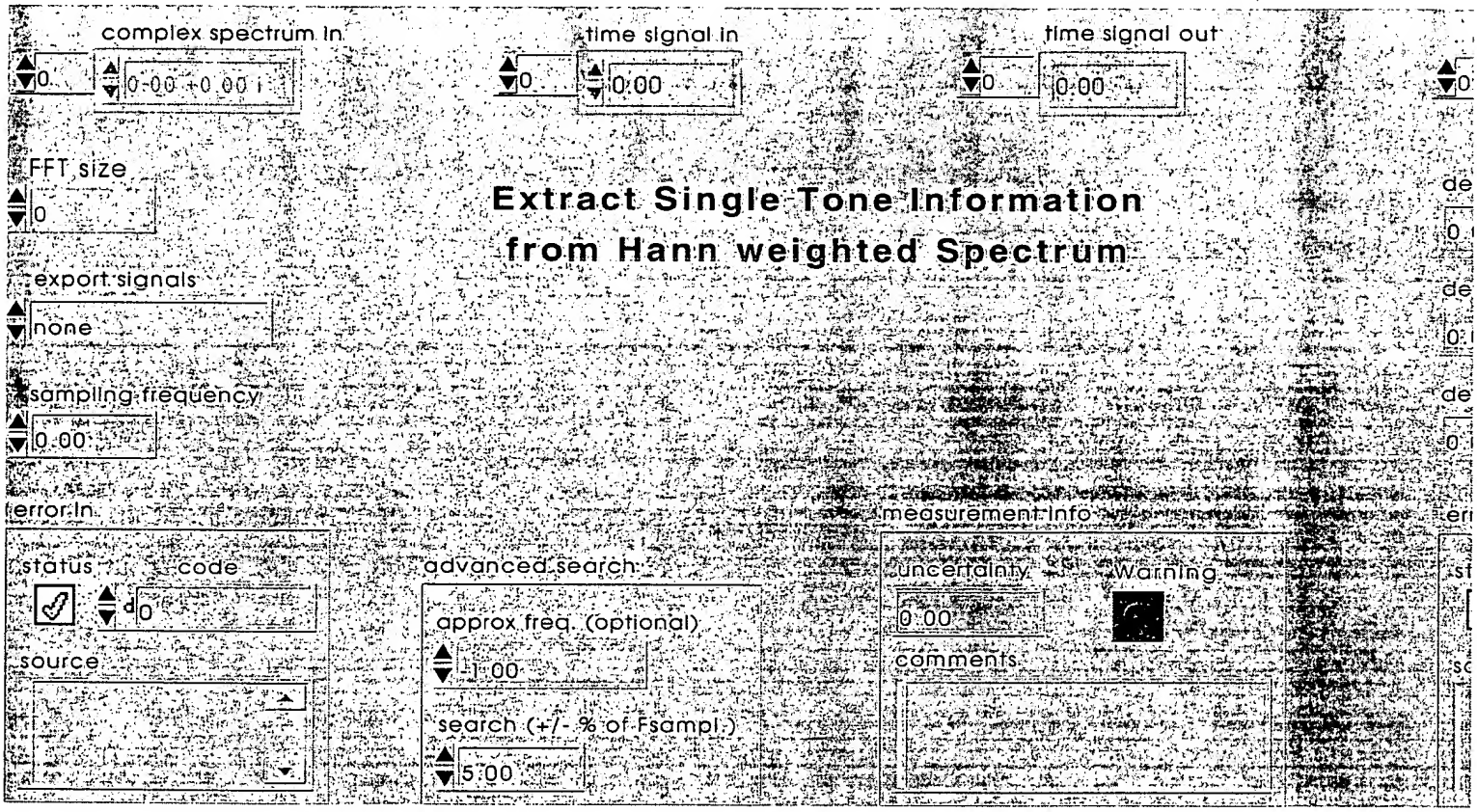
The following pages comprise a LabView™ virtual instrument, i.e. source code for a program written in the LabView™ graphical programming language.

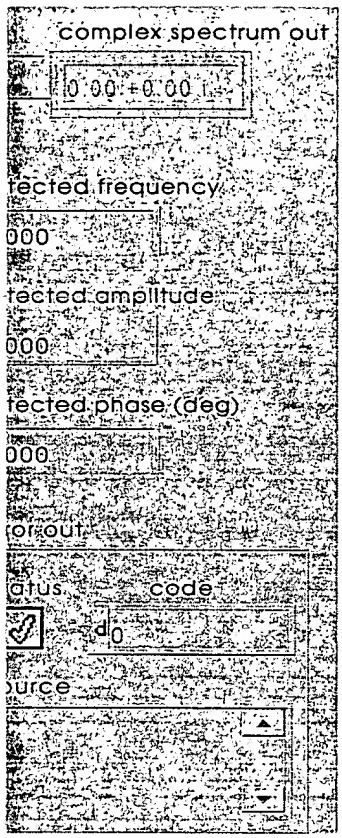
Connector Pane

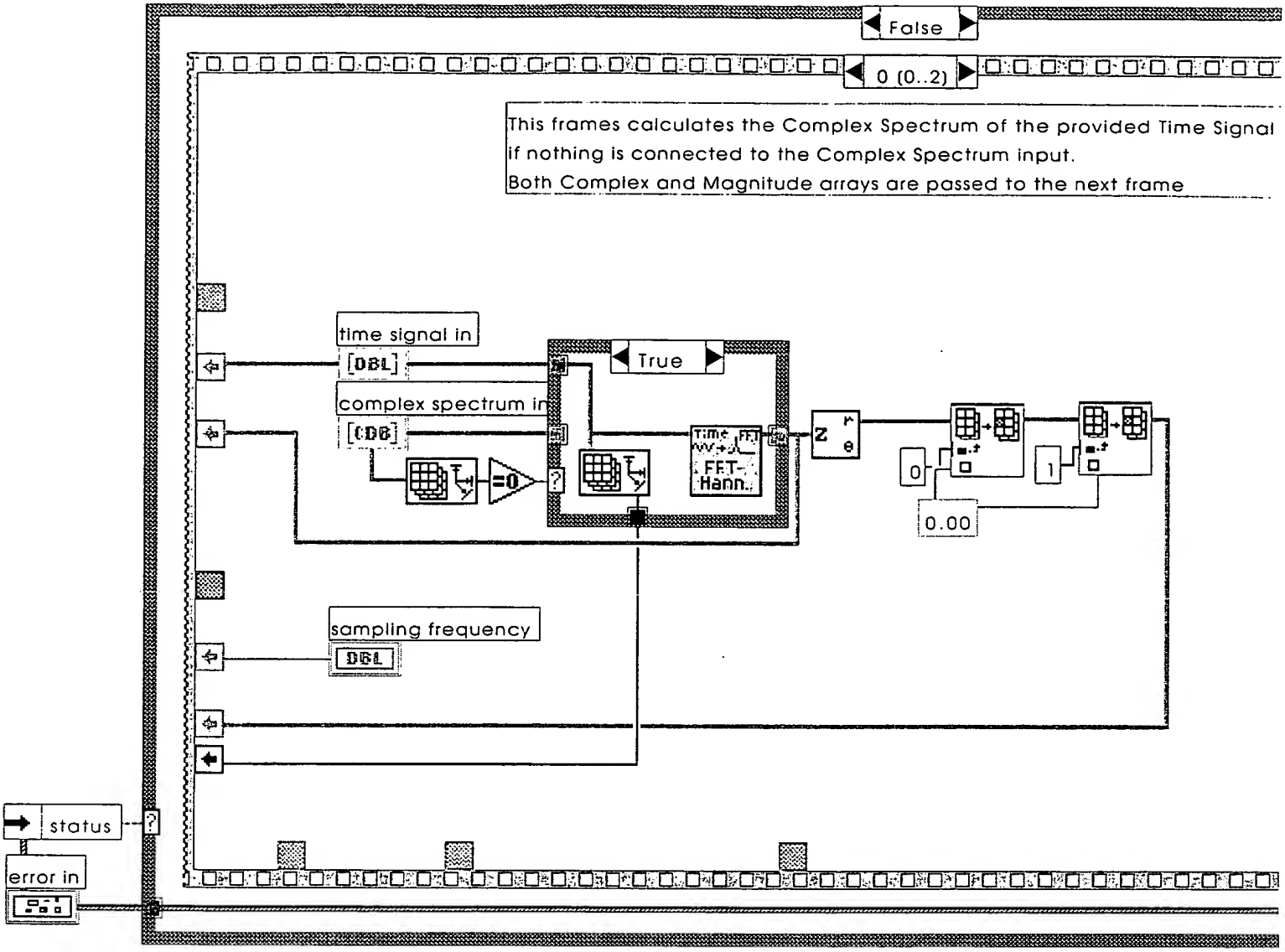


Extract Single Tone Information from Hann Spectrum with comments.vi

Front Panel



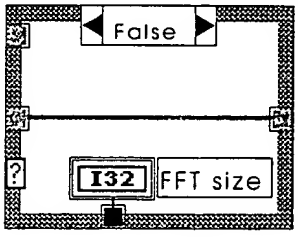

complex spectrum out
0.00 +0.00
tected frequency
000
tected amplitude
000
tected phase (deg)
000
or out
atus
code
0
urce

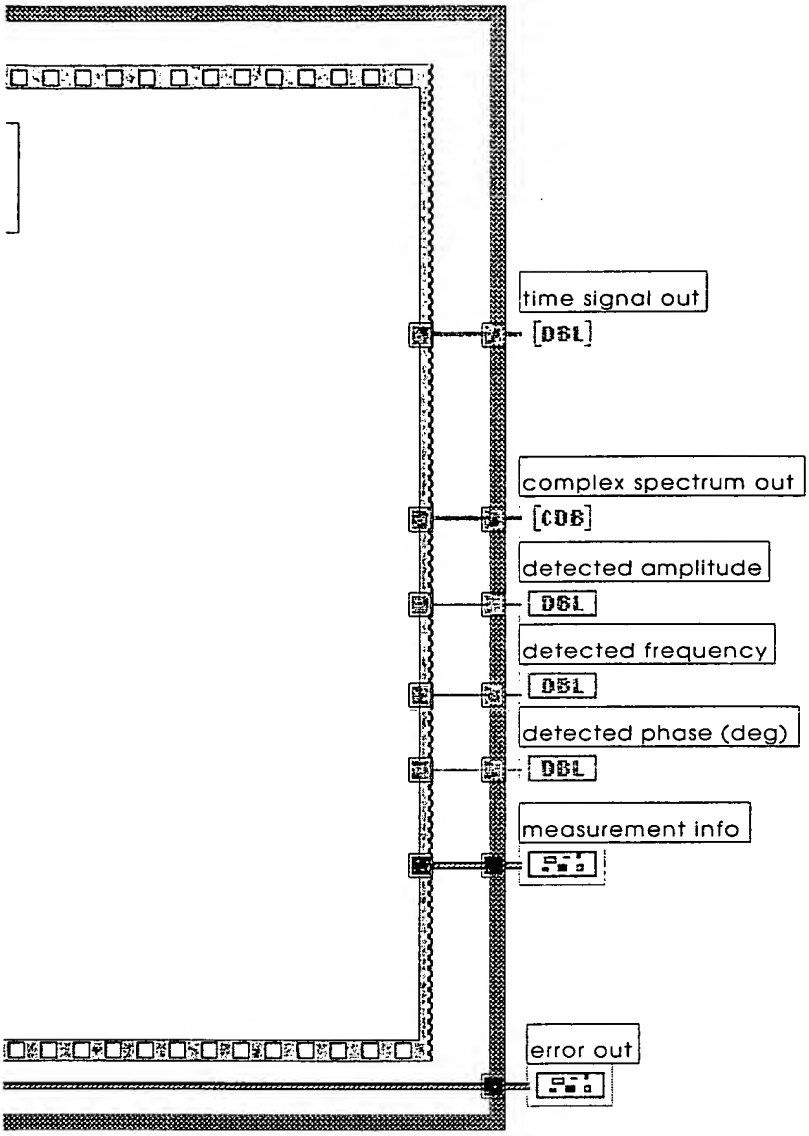


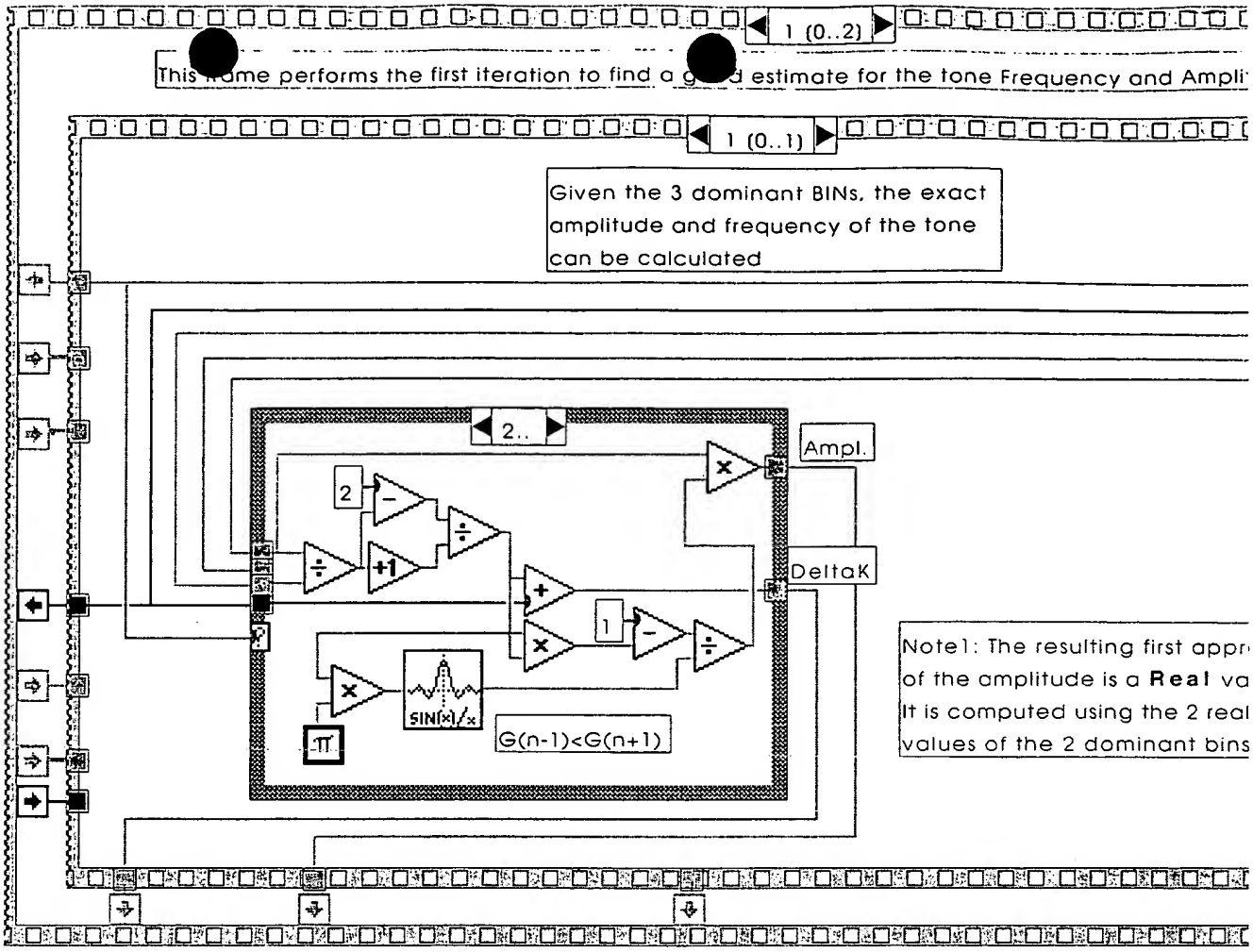
See Note1 in Frame 1 / Frame 1

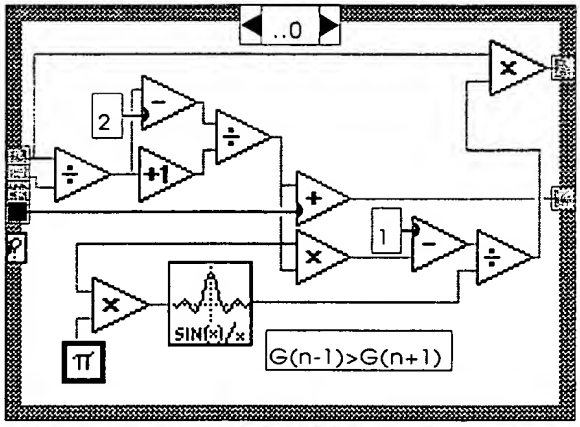
Note2: See Frame 2 / Frame 0
In this frame the phase information needed to compute the complex error signal for the relevant bins is extracted (**) Then the complex values for the relevant bins is extracted (***) and the computed complex error (****) is subtracted from (***) resulting in a corrected complex spectrum values that are re-inserted in the original spectrum.

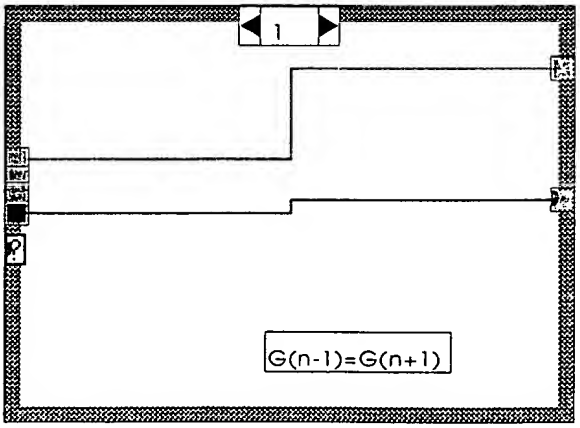
Note3: See Frame 2 / Frame 2
In this frame the phase information of the detected tone (not the relevant bins) is computed based on the value of the phase at bin (Kmax -1) and the corrected value of DeltaK

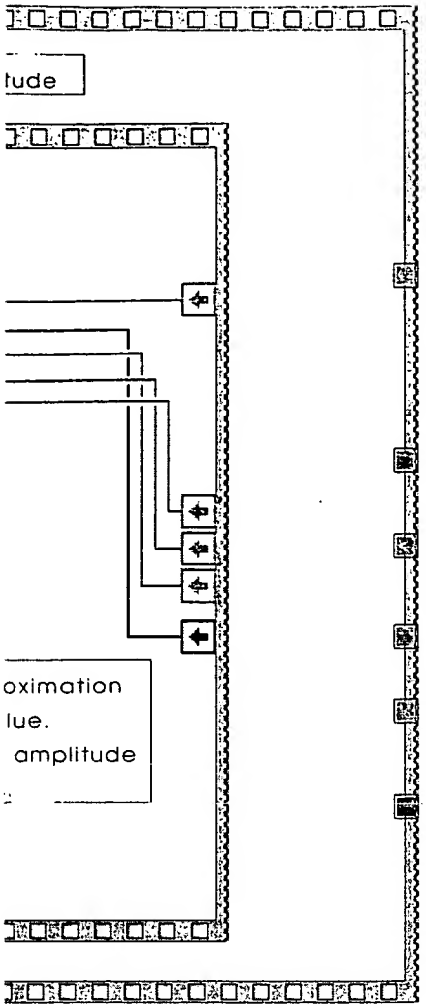


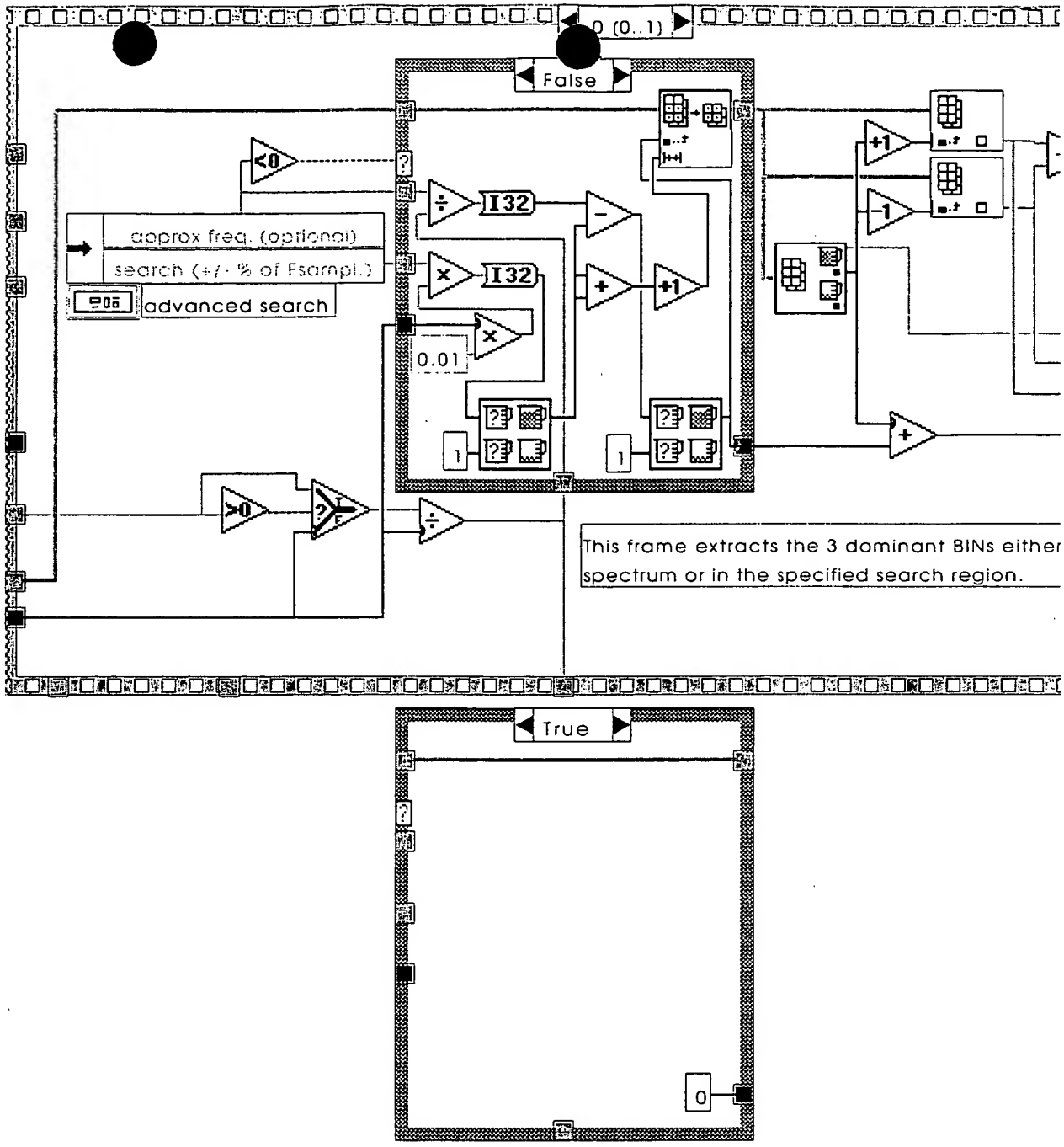

time signal out
[DBL]
complex spectrum out
[CDB]
detected amplitude
DBL
detected frequency
DBL
detected phase (deg)
DBL
measurement info
error out


1 (0..2)
This frame performs the first iteration to find a good estimate for the tone Frequency and Ampli
1 (0..1)
Given the 3 dominant BINs, the exact amplitude and frequency of the tone can be calculated
2..
Ampl.
DeltaK
2
+1
1
SIN(x)/x
π
G(n-1)<G(n+1)
Note1: The resulting first appr
of the amplitude is a Real va
It is computed using the 2 real
values of the 2 dominant bins

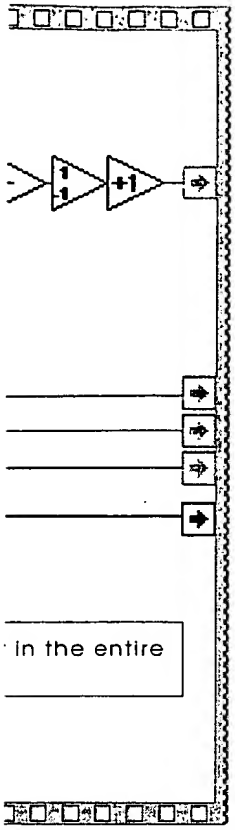

..0
2
+1
1
SIN(x)/x
π
G(n-1)>G(n+1)

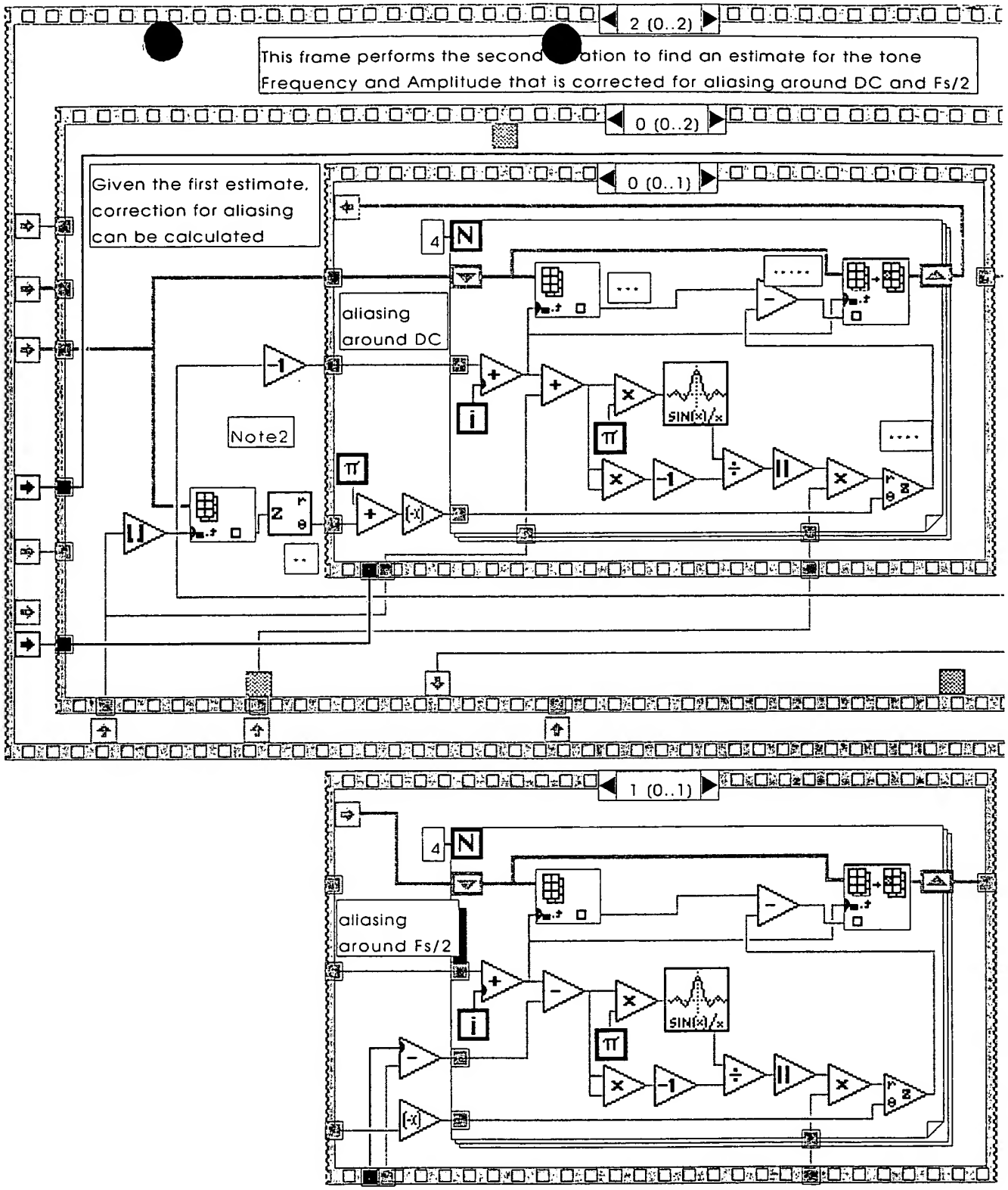

1
G(n-1)=G(n+1)

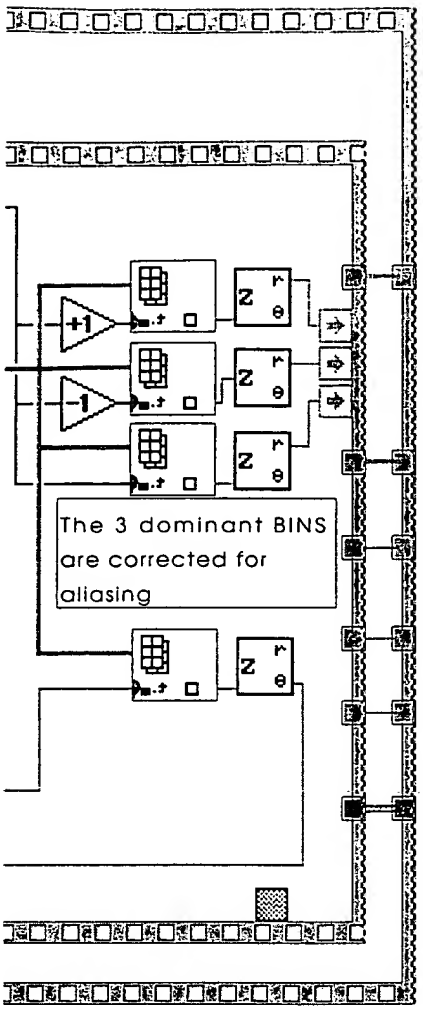

tude
oximation
lue.
amplitude

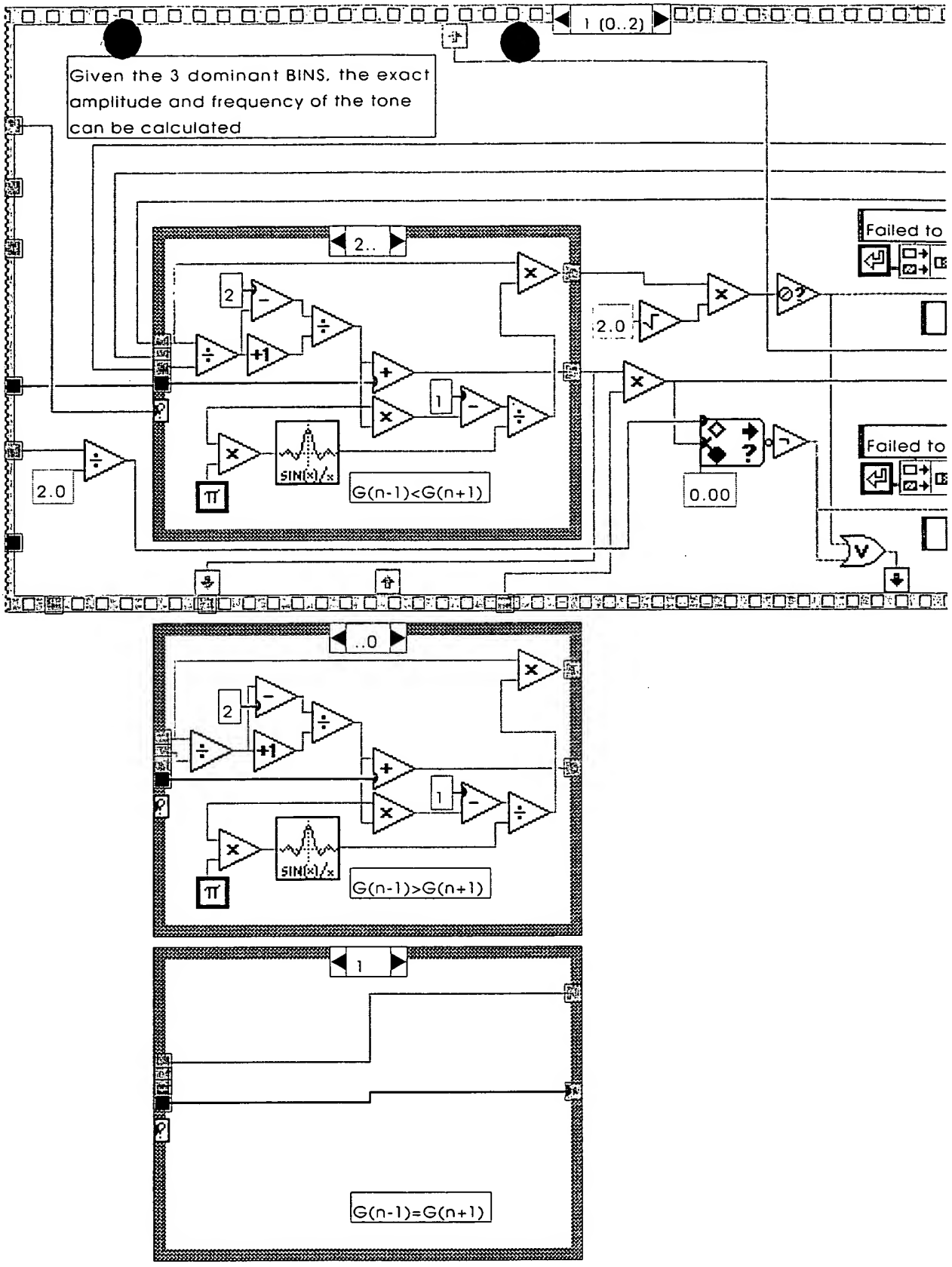

0 (0..1)
False
approx freq. (optional)
search (+/- % of Fsampl.)
advanced search
<0
I32
I32
0.01
+1
-1
>0
This frame extracts the 3 dominant BINs either
spectrum or in the specified search region.

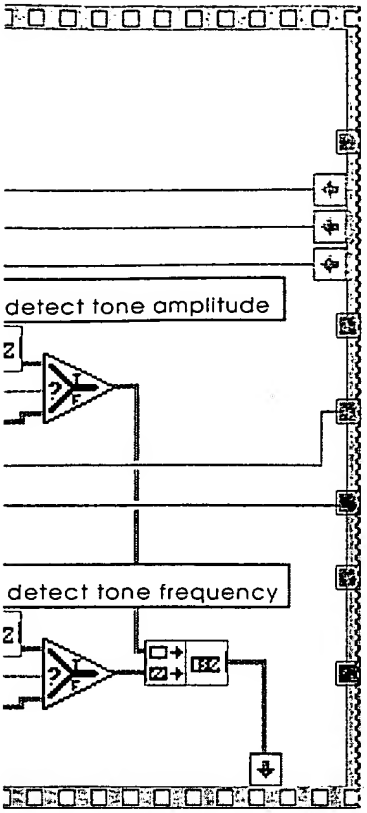
True
0

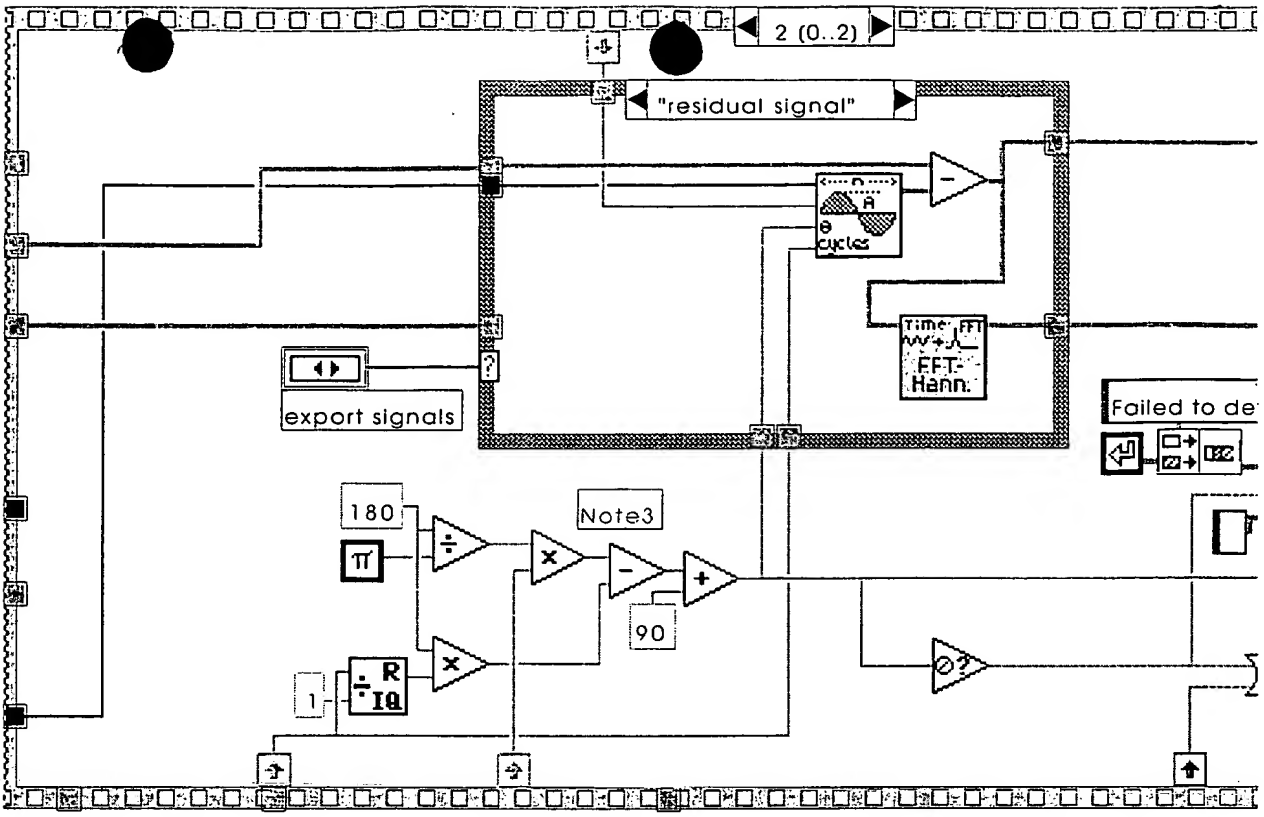

-1
-1
+1
in the entire

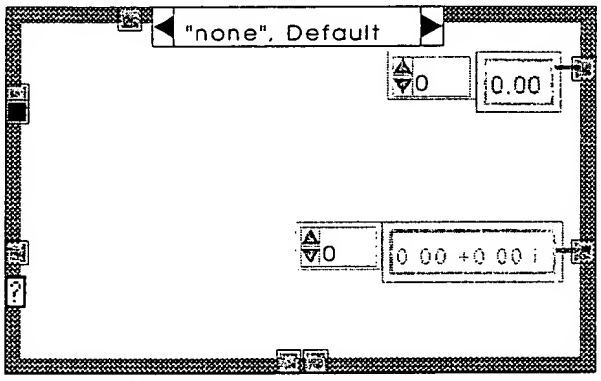

2 (0..2)
This frame performs the second ation to find an estimate for the tone
Frequency and Amplitude that is corrected for aliasing around DC and Fs/2
0 (0..2)
Given the first estimate,
correction for aliasing
can be calculated
0 (0..1)
4
N
aliasing
around DC
Note2
SIN(x)/x
1 (0..1)
4
N
aliasing
around Fs/2
SIN(x)/x

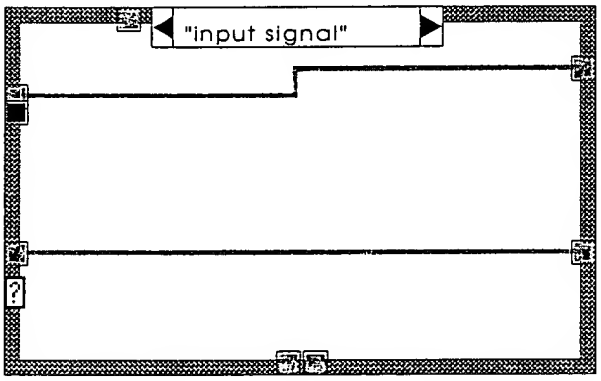

+1
-1
The 3 dominant BINS are corrected for aliasing

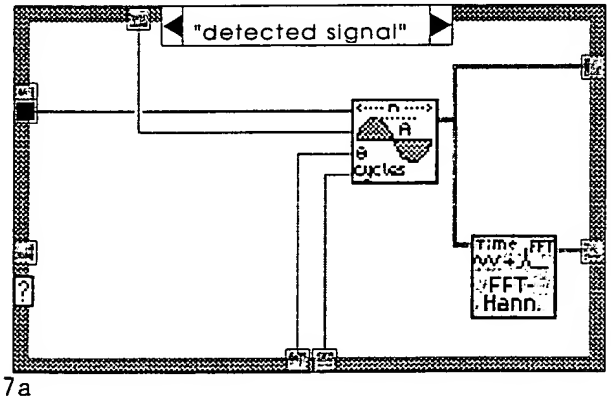

1 (0..2)
Given the 3 dominant BINS, the exact amplitude and frequency of the tone can be calculated
2..
2
+1
1
SIN(x)/x
π
G(n-1)<G(n+1)
2.0
2.0
0.00
Failed to
Failed to
..0
2
+1
1
SIN(x)/x
π
G(n-1)>G(n+1)
1
G(n-1)=G(n+1)

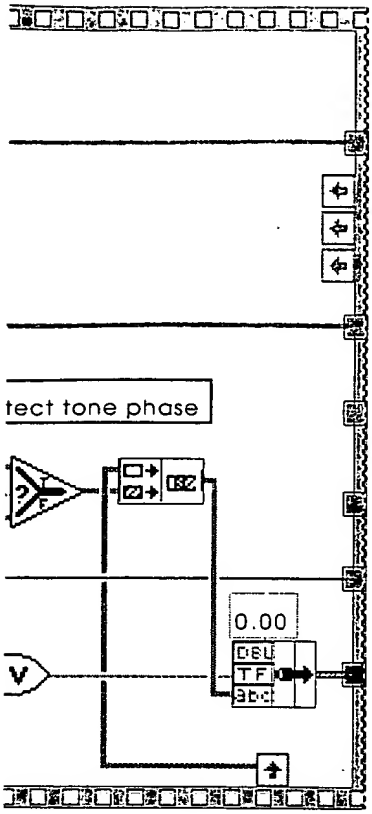

detect tone amplitude
detect tone frequency

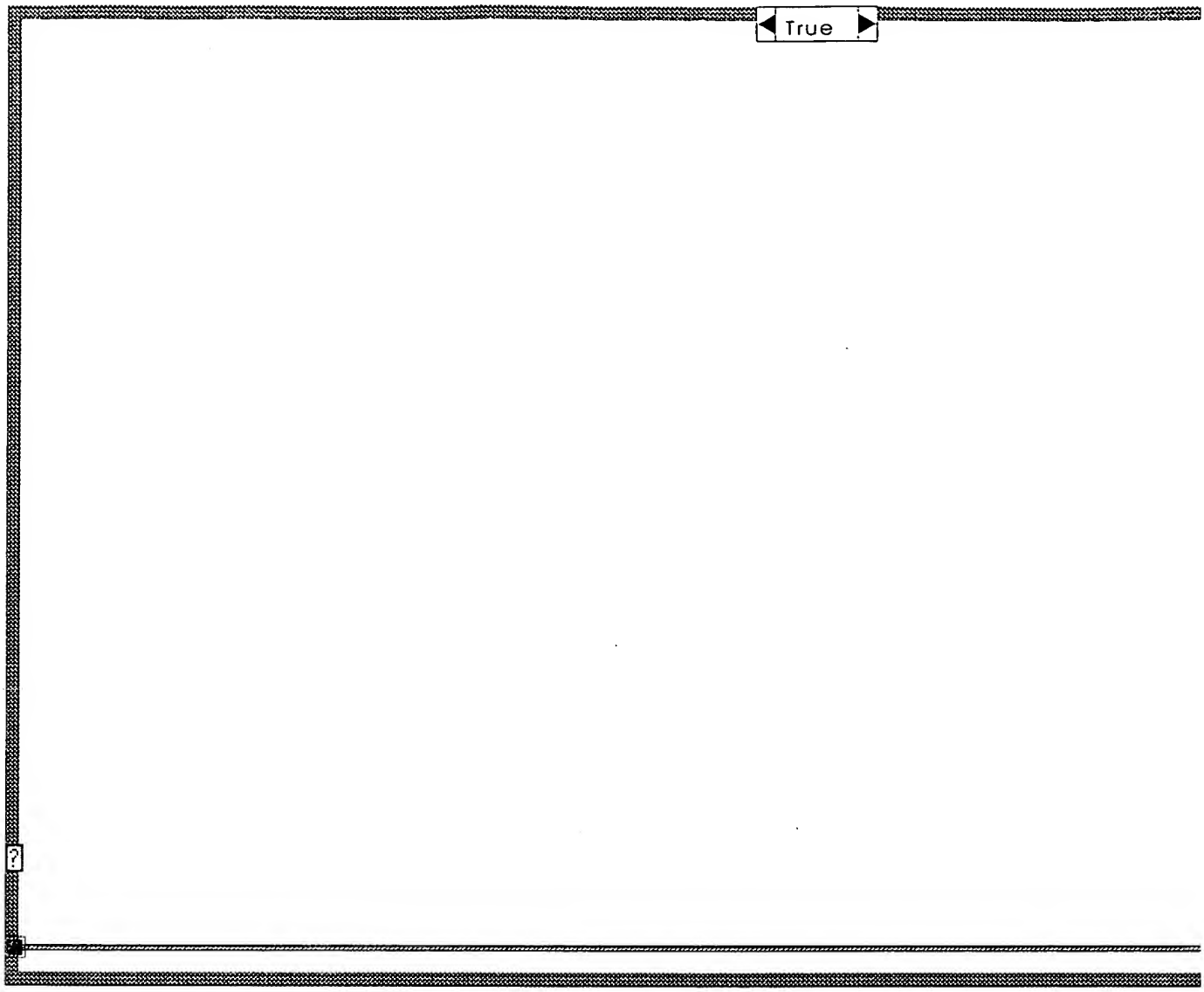

2 (0..2)
"residual signal"
cycles
FFT-Hann
export signals
Failed to de
180
Note3
90
1
R
Iq

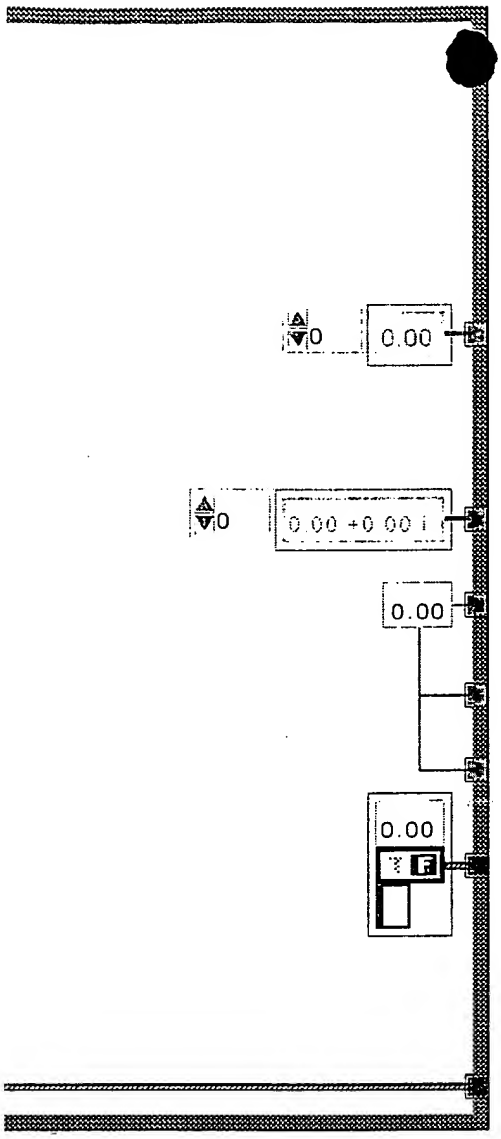

"none", Default
0
0.00
0
0.00 +0.00 i


"input signal"


"detected signal"
cycles
FFT-Hann


tect tone phase
0.00
TF


True
?


0
0.00
0
0.00 +0.00 i
0.00
0.00
F